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| 10/645,154      | 08/21/2003  | Rafael Rodriguez     | D- 188              | 7193             |

7590 06/14/2006

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EXAMINER

ECHELMEYER, ALIX ELIZABETH

| ART UNIT | PAPER NUMBER |
|----------|--------------|
|----------|--------------|

1745

DATE MAILED: 06/14/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/645,154

Applicant(s)

RODRIGUEZ ET AL.

Examiner

Alix Elizabeth Echelmeyer

Art Unit

1745

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 21 August 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)             | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)    | Paper No(s)/Mail Date. _____  |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____   | 6) <input type="checkbox"/> Other: _____                                    |

## DETAILED ACTION

### *Priority*

1. Applicants' claim to priority to provisional application 60/405,162 is acknowledged.

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 1 and 13 are rejected under 35 U.S.C. 102(b) as being anticipated by Seki et al. (US Pre-Grant Publication 2004/0110068).

Seki et al. teach a lithium secondary cell comprising a positive electrode, a negative electrode, and an electrolyte comprising a non-aqueous solvent in a solvent (abstract, [0104]). Seki et al. further teach that the solute is made up of a lithium salt and a polymer ([0148], [0150]).

Seki et al. also teach that silica can be used in the electrolyte ([0223]). According to Seki et al., polyacrylonitrile is among the acceptable organic polymers for the electrolyte ([0140]).

The teachings of Seki et al. anticipate the elements of Applicants' claims 1 and 13, including the inorganic oxide, organic polymer, and a non-aqueous electrolyte solution containing a lithium salt in an organic solvent.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 2-12 and 15-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Seki et al. in view of Sannier et al. (US Pre-Grant Publication 2005/0191558).

The teachings of Seki et al. as discussed above are incorporated herein.

Regarding claims 2 and 4-6, 15, and 17, Seki et al. teach the rechargeable polymer battery of claim one but fail to teach the polymer electrolyte as a thin film coating applied to at least one of the electrodes and that silicon dioxide and poly(vinylidene fluoride)-hexafluoropropene (PVDF-HFP) specifically are components of the film.

Sannier et al. teach a gelled separator containing silicon dioxide and PVDF-HFP between the electrodes of an electrochemical lithium cell battery as a film on the surface of the electrodes (abstract, [0054]-[0056]). The gelled separator is applied in the gel

form as a film so as advantageously to eliminate one step in the manufacturing process ([0065]).

It would be desirable to apply the separator as a film to one or both of the electrodes in order to eliminate one step of the manufacturing process, thus saving time or resources or both.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to apply the separator as a film to one or more of the electrodes in order to eliminate one step in the manufacturing process.

As for claims 3 and 16, Seki et al. teach that the content of polymer in the electrolyte is most preferable at least 5 weight percent ([0161]).

As for claims 7 and 17, Seki et al. teach that the electrolyte may contain any conventional lithium salt, such as  $\text{LiAsF}_6$ ,  $\text{LiPF}_6$ ,  $\text{LiBF}_4$ ,  $\text{LiN}(\text{O}_2\text{SCF}_3)$ , or  $\text{LiClO}_4$  ([0148]).

Regarding claims 8-10, Seki et al. teach that the non-aqueous solvent of the electrolyte is a mixture of a cyclic carbonate such as ethylene carbonate and a non-cyclic carbonate such as dimethyl ethyl carbonate or ethyl methyl carbonate ([0098]).

As for claims 11 and 19, Seki et al. teach that the negative electrode active material can be, among other materials, graphite, metal lithium, or a lithium alloy ([0136]-[0137]).

As for claims 12 and 19, Seki et al. teach that the positive electrode active material is capable of absorbing and desorbing lithium. Seki et al. give examples of appropriate materials, including a Li-Co compound oxide, a Li-Ni compound oxide, and

a Li-Mn compound oxide. Further, other elements can be substituted for the non-lithium components of the oxides listed ([0106]-[0122]).

4. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Seki et al. in view of Sannier et al. in further view of Ward et al. (US Pre-Grant Publication 2004/0123450).

The teachings of Seki et al. and Sannier et al. as discussed above are incorporated herein.

Seki et al. in view of Sannier et al. teach the electrode-electrolyte assembly having a thin coating of composite polymer electrolyte on the surface but fail to teach a thin foil of electrochemically active material.

Ward et al. teach that an anode, cathode, or both made of a metallic foil with a width less than that of the polymer electrolyte layer ensures separation by the gel. Further, suitable foil electrode materials, such as lithium metal as taught by Seki et al., would occur to those skilled in the art.

It would be desirable to use a metallic foil as the anode or cathode in order to ensure separation by the polymer electrolyte gel.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to use a metallic foil for the anode, cathode, or both in order to ensure separation by the polymer electrolyte gel layer.

5. Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over Seki et al. in view of Sannier et al. as applied to claims 15-19 above, and further in view of Kircher (US Patent Number 6,730,179) and Michaels (US Patent Number 6,112,908).

The teachings of Seki et al. and Sannier et al. as discussed above are incorporated herein.

Seki et al. in view of Sannier et al. teach the coating of a thin film of electrolyte solvent, including inorganic oxide and organic polymer in a lithium salt and an organic solvent. Further, Seki et al. in view of Sannier et al. teach the limitations laid out in claims 16-17. Seki et al. in view of Sannier et al. also teach the use of fumed silica in a solution of PVDF-HFP in a plasticizer and solvent, but fail to teach specifically the use of N-methyl pyrrolidine as the plasticizer and ethyl alcohol as the solvent.

Kircher teaches a slurry using ethyl alcohol and N-methyl pyrrolidine for making a thin film because the solution can have a wide range of viscosities (column 8 lines 35-41).

It would be advantageous to use ethyl alcohol and N-methyl pyrrolidine in a slurry that will be put down as a thin film because the solution can have a wide range of viscosities depending on the requirements of the producer.

Therefore, it would have been obvious to one having ordinary skill in the art to use the slurry of Kircher to make the battery of Seki et al. in view of Sannier et al. in order to produce a slurry having a wide range of viscosities.

Michaels also teaches the mix of ethyl alcohol and N-methyl pyrrolidine, stating that this creates a slurry having low volatility (column 3 lines 38-42).

It would be desirable to use the slurry of Michaels to produce the battery of Seki et al. in view of Sannier et al. in order to reduce the volatility of the components of the battery.

Therefore, it would have been obvious to use the slurry of Michaels to make the battery of Seki et al. in view Sannier et al. in order to reduce the volatility of the components of the battery.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alix Elizabeth Echelmeyer whose telephone number is 571-272-1101. The examiner can normally be reached on Mon-Fri 7-4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick J. Ryan can be reached on 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.



Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Alix Elizabeth Echelmeyer  
Examiner  
Art Unit 1745

aee



PATRICK JOSEPH RYAN  
SUPERVISORY PATENT EXAMINER